AbstractID: 1179 Title: Eliminating Cerenkov Interference from a Real-Time Optical Radiation Detector

A new *in-vivo* dosimetry system has been under development for some time using radioluminescent phosphors. These phosphors are activated, metal ion doped glasses that have excellent optical transparency and offer several potential advantages for radiation dosimetry; including: small size, high sensitivity, linearity of dose-response insensitivity to electromagnetic interference. The utility of these phosphors as a detection modality has been limited in real-time dosimetry applications due to the production of Cerenkov radiation in the carrier fibers, which produces a contaminant signal proportional to dose rate as well as the size of the radiation field.

There are three possible methods for eliminating this signal: (1) use of paired blank fibers, (2) use of a detector which fluoresces at a wavelength substantially different from the Cerenkov radiation, and (3) use of an electronic gating signal from the accelerator to delay data acquisition during the actual beam pulse, when Cerenkov radiation is produced. Due to the intrinsic properties of our particular scintillator, the third method offers the best mechanism for eliminating Cerenkov noise, while retaining the ability to detect individual beam pulses.

Measurements were made using both a 6 MV low energy and a 6/15 MV dual energy linear accelerator, each with a different gating signal available for use. Preliminary data show that the Cerenkov noise can be eliminated, but that the characteristics of the gating pulse and the acquisition timing delay are critical components.